Eliminating Adverse Impacts of Low Dissolved Oxygen in the Sound

The Long Island Sound Study identified low dissolved oxygen (hypoxia) as the most significant water quality problem in LIS. Since 1990, EPA and the States of Connecticut and New York have implemented a phased program that first capped, and will subsequently reduce, human-caused nitrogen loads to LIS over a 15-year period.

Strategy:

The CCMP identified a five part strategy to address the elimination of adverse impacts of low dissolved oxygen in the Sound: 1) reducing nitrogen from sewage treatment plants (STPs) and other point sources; 2) reducing nitrogen loads from nonpoint sources; 3) continuing management of hypoxia; 4) funding implementation of hypoxia management plans; and 5) monitoring and assessing hypoxia. There are 8 *Ongoing Programs* and 35 *CCMP Actions* to implement this strategy. In 1999, of the 35 *CCMP Actions*, 13 are reported *Complete*; 8 *Substantive Progress/Fully Met*; 10 *Partial Progress/Behind Schedule*; 3 *Not Initiated*; and 1 *Discontinued*.

***Highlights*:**

- **The states of New York and Connecticut released a draft Total Maximum Daily Load (TMDL) for nitrogen to public comment in November 1999. The TMDL is consistent with the July 1998 *Phase III Actions for Hypoxia Management,* a bi-state agreement calling for a 58.5 percent reduction in human-caused (anthropogenic) nitrogen loads to the Sound over a 15 year period beginning in 1999.**

  The agreement includes interim targets to achieve 40 percent of the goal in 5 years, and 75 percent of the goal in 10 years. This level of reduction is expected to reduce the maximum area of the Sound that is unhealthy for fish and shellfish by 75 percent, and the duration of unhealthy conditions in the Sound by 85 percent.

- **The estimated nitrogen load from STPs in the LIS drainage basin that entered the LIS in 1999 is approximately 151,245 lbs/day, a decrease of nearly 36,000 lbs/day from 1990 levels, and nearly 10,000 lbs/day less than 1998.**

- **New York's 1999 point source nitrogen loading was 105,759 lbs/day, compared with 110,595 lbs/day in 1998. Connecticut's point source nitrogen loading was 45,486 lbs/day in 1999 compared with 49,846 lbs/day in 1998. Figure 1 shows point source nitrogen load trends in New York and Connecticut since 1990.**

- **In 1999, the maximum area and duration of dissolved oxygen (DO) levels less then 3 mg/l in LIS was 314 km² (121 mi^2)and 50 days. This was less than the 1998 levels of 436 km^2 (168 mi^2)and 73 days, and below the 10 year average of 470km^2 (181 mi^2) and 57 days. Figure 2 shows the timing and duration of hypoxia in LIS since 1987; Figure 3 shows the maximum area of hypoxia in LIS since 1990; Figure 4 shows the percent of the total area of LIS hypoxic conditions from 1990.**

- **Both states continued to prioritize funding for nonpoint source pollution control projects benefitting the Sound.**

- **The Norwalk River Watershed Advisory Committee met monthly in 1999 to guide implementation of the Plan.**

- **The lawsuit initiated in 1998 by NYSDEC**

against New York City for violations at its sewage treatment facilities has been resolved. Under the resolution, New York City will pay $1.5 million ($50K penalty to NYS and $1 million into a trust account to be established by the Hudson River Foundation) and will undertake plant and sewer system upgrades.

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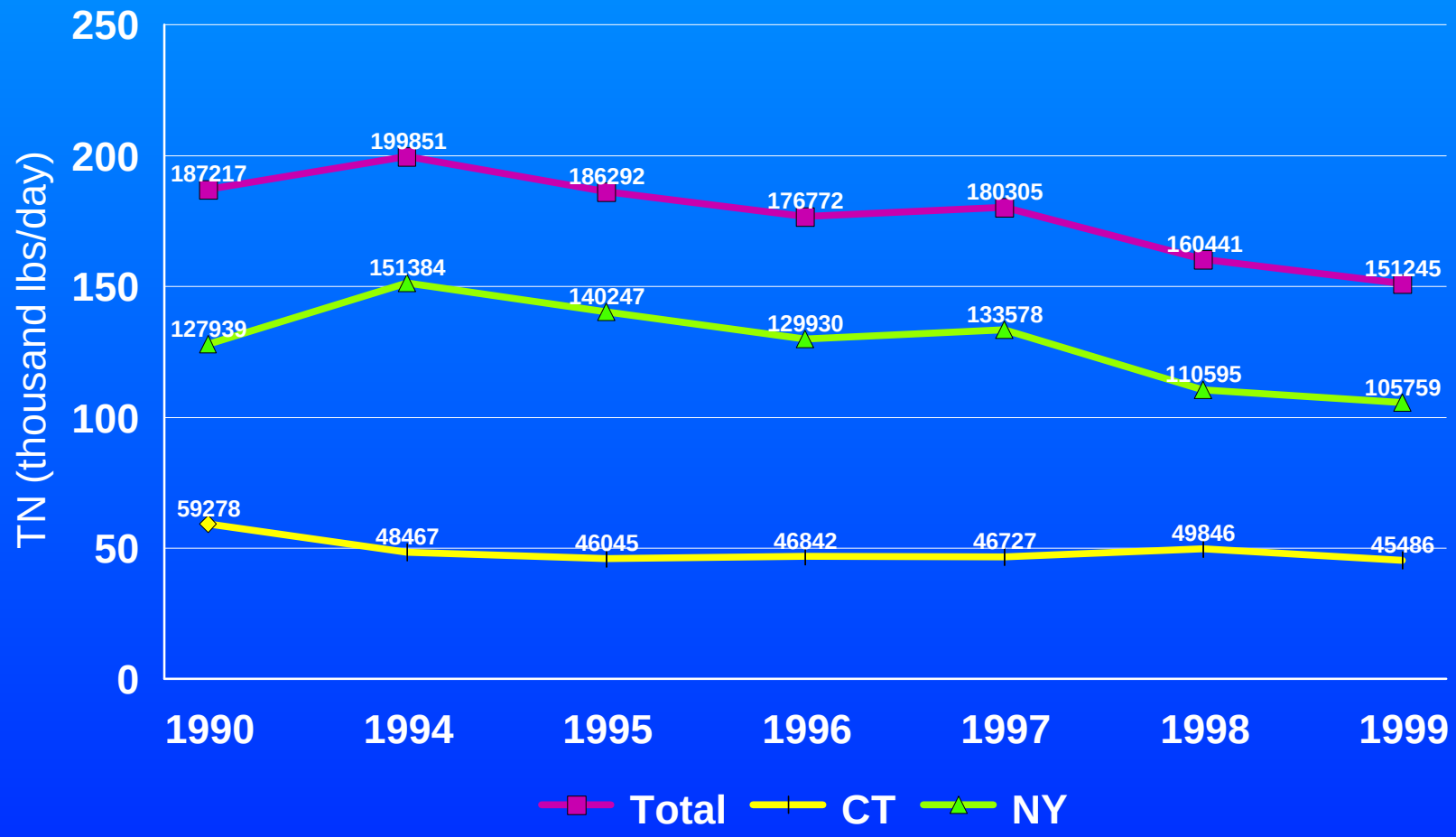
Fig. 1: Point Source Nitrogen Load to Long Island Sound



These estimates include 98 municipal, 4 state, 3 private, and 4 industrial discharges = 109

Fig. 2: Timing and Duration of Hypoxia in Long Island Sound

1987-1990 University of Connecticut
1991-1999 Connecticut Department of Environmental Protection

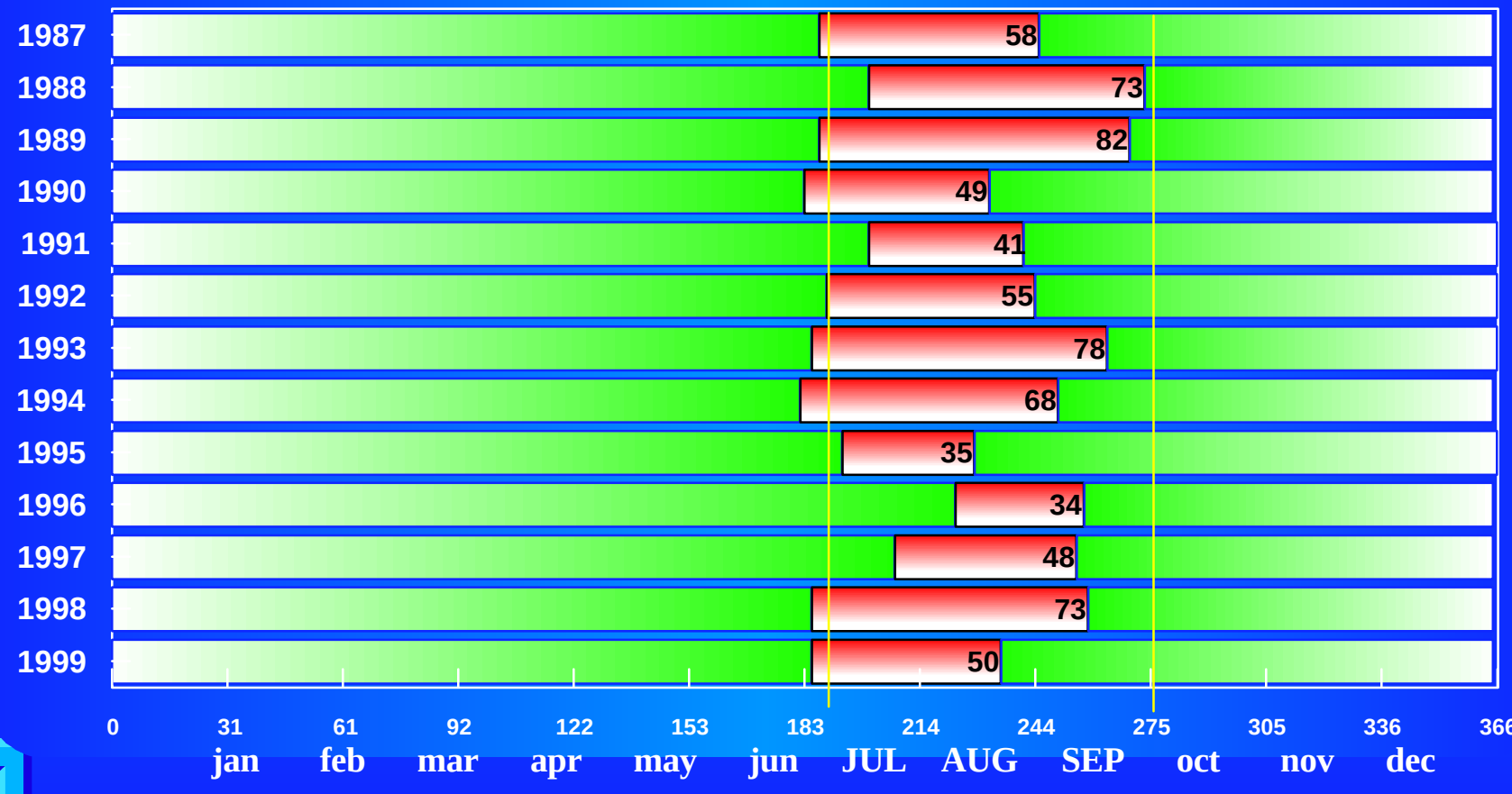
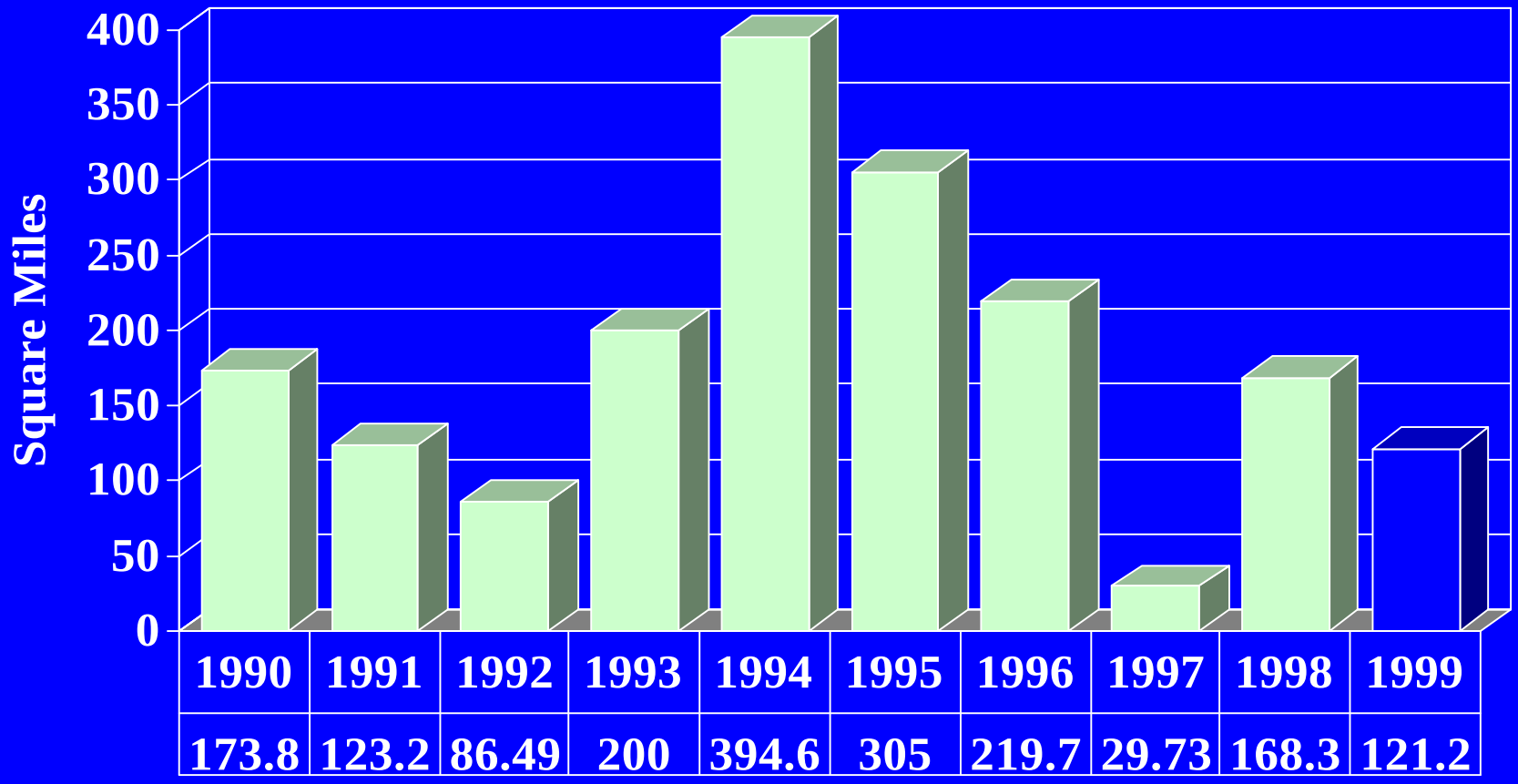


Fig. 3: Maximum Area of Long Island Sound During Summer Hypoxic Event

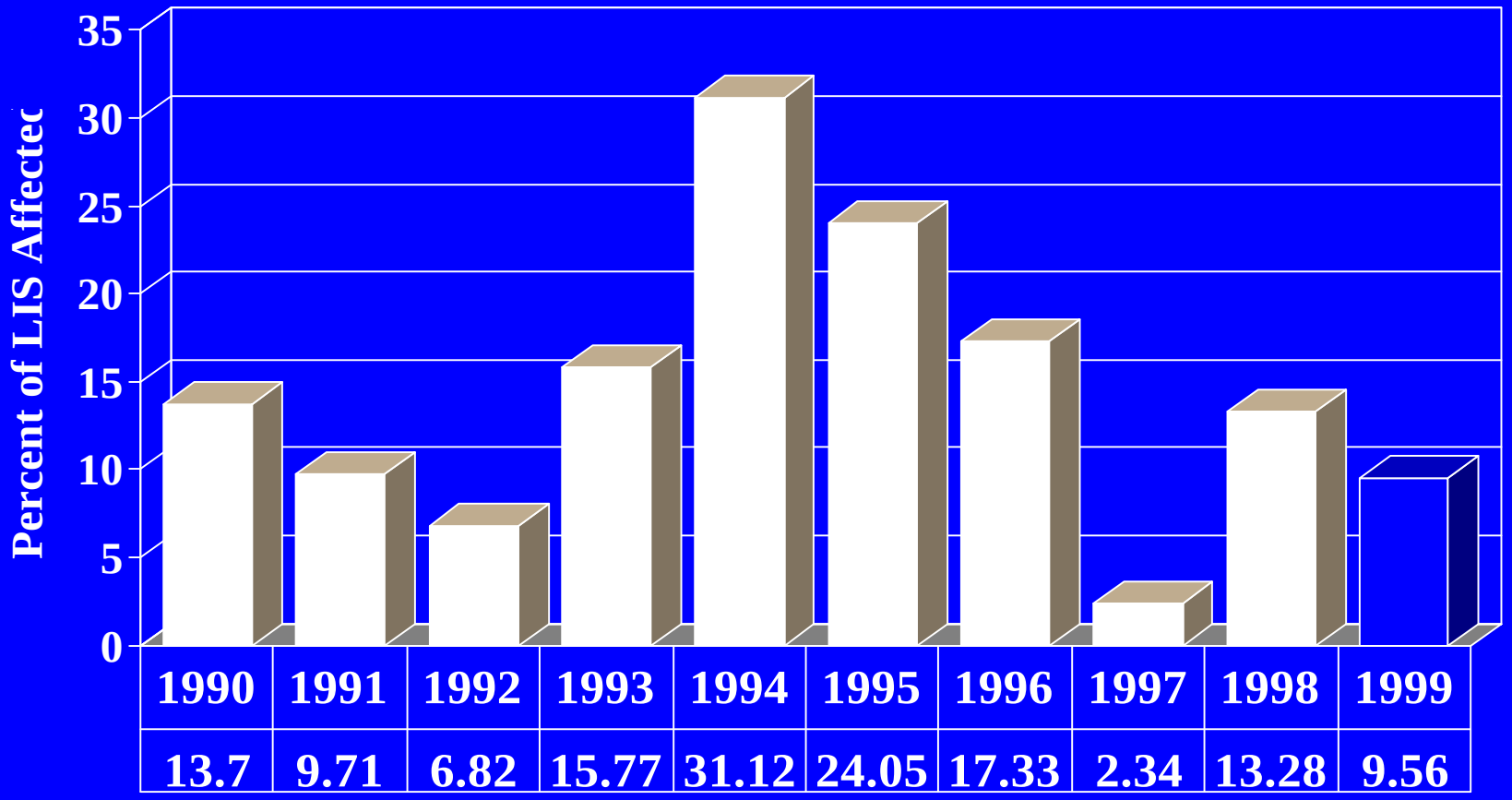
(D.O. Concentrations Less than 3.0 mg/l)



1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
173.8	123.2	86.49	200	394.6	305	219.7	29.73	168.3	121.2

Fig. 4: Percent Total Area of Long Island Sound During Summer Hypoxic Event

(D.O. Concentrations Less than 3.0 mg/l)



1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
13.7	9.71	6.82	15.77	31.12	24.05	17.33	2.34	13.28	9.56

SUMMARY OF MANAGEMENT ACTIONS: HYPOXIA

1. REDUCING NITROGEN FROM SEWAGE TREATMENT PLANTS AND OTHER POINT SOURCES (CCMP TABLE 4, P. 32)

Ongoing Programs	Responsible Parties	Status[2]	Description	Upcoming Action
H1-1. The states of New York and Connecticut will continue their point and non-point source permitting and enforcement programs as a primary mechanism of pollutant load reduction. Fundamental to the direction of these programs are the states' water quality standards and classifications that provide the basis for management policies and decisions.	**CTDEP NYSDEC**	Substantive Progress	In Connecticut, CTDEP has used this authority to implement nitrogen retrofits at sewage treatment plants, encourage full upgrades for nitrogen removal at plants scheduled for reconstruction and reduce nitrogen loads at major industries. In New York, NYSDEC issued permits with nitrogen limits requiring compliance with 1990 "no-net-increase" load limits. Limits for the NYC STPs went into full effect on January 1, 1997. NYSDEC filed suit against NYCDEP in March 1998 for not meeting these limits. In June 1999, the suit was resolved. Through implementation of the NYCDEP nitrogen control program, the four Upper East River WPCPs are now operating well below the aggregate SPDES effluent limits for total nitrogen.	New denitrifying facilities are planned for Branford (2001), Fairfield (2001) and upgrade to the Stamford facility (2001). Nitrogen permit and trading programs are under development in Connecticut.
H1-2. The state of New York will ensure compliance with the consent order to upgrade the Newtown Creek plant to provide secondary treatment with biological nutrient removal retrofit modifications.	**NYSDEC NYCDEP**	Substantive Progress	A two track facility plan for upgrading Newtown has been approved by NYSDEC. The plan is to provide 50% influent nitrogen removal either through step denitrification or through the use of biofilters. Estimated project cost is $2 B, with construction to be completed by 2010. A $12 million biofilter evaluation (4 mgd capacity) began operation in December 1996. In 1997, the biofilter was evaluated and final design for Phase I common elements was completed. NYCDEP has submitted a track III facility plan (cost $1.3 B) which would achieve secondary treatment at Newtown Creek and the NYCDEP would remove additional nitrogen at the four Upper East River plants to meet the original intent of the Newtown Creek consent order. The NYSDEC is currently reviewing the track III proposal. Upgrading and expansion construction is continuing with Phase VI.	New additions planned for the facility include a new wing to the main building, a support and disinfection building, sludge handling facilities, a sludge force main/docking facility and aeration upgrades.
H1-3. The state of Connecticut will freeze nitrogen discharges and, if appropriate, explore opportunities to reduce nitrogen discharges at three industrial facilities with significant nitrogen discharges.	**CTDEP**	Fully Met	*Upjohn* has discontinued production, is no longer treating process water, and is currently conducting ground water remediation *Pfizer's* treatment facility has been in operation over 2 years and a manufacturing process has been discontinued which formerly had generated high nutrient waste. *Pfizer's* waste water nutrient loads are less than 25% of baseline. *Cytec* was issued a new permit (April 1998) which included language to conduct a scope of study to evaluate options for treatment of total nitrogen in its waste water. A report has been submitted to CTDEP. The Cytec permit expires 2003.	CTDEP will be reviewing the *Cytec* scope of study report.

KEY: 1) Type: Commitment; Recommendation

2) Status for dated actions: Complete, Ahead of Schedule, On Schedule, Behind Schedule, Partially Addressed, Not Initiated
Status for *Ongoing Programs* and ongoing *CCMP Actions*: Fully Met, Substantive Progress, Partial Progress, Discontinued

1. REDUCING NITROGEN FROM SEWAGE TREATMENT PLANTS AND OTHER POINT SOURCES (CCMP TABLE 4, P. 32)

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	Description	Upcoming Action
H1-4. The municipalities in the states of Connecticut and New York will implement biological nutrient removal retrofits to reduce the load of nitrogen to the Sound on an interim basis.	**C**	**CTDEP**	**By 1995**	**$18.1 M**	**Complete**	**CT State Clean Water Fund awarded $15 M to retrofit 11 southwestern Connecticut sewage treatment plants. All the projects have been completed and have resulted in achievement of the Phase II reduction goal of 850 tons per year.**	**Keep running the facilities as designed under the Phase II retrofit program.**
		NYSDEC	**1995 for 5 plants 1996 for 4 plants 2000 for centrate**	**$103.1 M**	Substantive Progress	NYCDEP presented a comprehensive progress report on its efforts at a December 1999 session. Biological Nutrient Reduction (BNR) retrofits at upper East River facilities resulted in attainment of permit limits by July 1998. The total point source nitrogen load to LIS in 1999 was 151,245 lbs/day, well-below the 1990 target of 187,217 lbs/day. In CT, the point source load to LIS was 45,486 lbs/day; in NY the point source load was 105,759 lbs/day. Three projects will be awarded approximately $38 M from NYS Bond Act funds in 2000. The County of Westchester Board of Legislators approved bonds to fulfill federal mandates and upgrade STPs. The STPs in Port Chester, Mamaroneck and New Rochelle will receive $2.6, $8, and $11.5 million dollars, respectively.	NYS Bond Act funds will continue to be awarded and more projects will be initiated.
H1-5. Conduct feasibility studies and pilot demonstrations for nitrogen removal at 13 of its [NYC] 14 sewage treatment plants, with actual design for Newtown Creek.	**C**	**NYCDEP**	**1994-1998**	**$5 M**	**Complete**	**NYCDEP completed a Nitrogen Control Feasibility Plan in December 1998 to identify the feasibility of removing nitrogen from each of its 14 STPs.**	**NYCDEP will continue conducting pilot work to test new processes and technologies.**
H1-6. Westchester County will investigate sludge rehandling at their four facilities to determine if opportunities exist for nitrogen load reduction.	**C**	**Westchester County**	**1993-1994**	**$500,000**	Substantive Progress	Westchester County will hire a contractor to haul away liquid sludge from its STP in Port CHester. The new contract means that trucks will haul the sludge produced at the Blind Brook and Port Chester plants, which is now burned in Port Chester, to a facility in New Jersey and turn it into a product that could be used either in landfills or for open space reclamation in Pennsylvania. This is expected to reduce the amount of nitrogen that the county dumps into Long Island Sound from Port Chester by 3 percent.	Westchester Count will begin phasing out the use of incinerators at the Port Chester STP by May 1, 2000.

KEY: 1) Type: Commitment; Recommendation

2) Status for dated actions: Complete, Ahead of Schedule, On Schedule, Behind Schedule, Partially Addressed, Not Initiated
Status for *Ongoing Programs* and ongoing *CCMP Actions*: Fully Met, Substantive Progress, Partial Progress, Discontinued

1. REDUCING NITROGEN FROM SEWAGE TREATMENT PLANTS AND OTHER POINT SOURCES (CCMP TABLE 4, P. 32)

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	Description	Upcoming Action
H1-7. The state of New York will continue to seek to reach agreement with Belgrave, Great Neck East Shore, Huntington, Oyster Bay, Port Washington, and Kings Park on permit modifications for implementing the *no net increase* in nitrogen policy.	**C**	**NYSDEC**	**1994**	**Redirection of base program**	**Complete**	**Agreement was reached in August 1994 on an aggregate limit to freeze the loads at 1990 levels.**	**None**

2. REDUCING NITROGEN LOADS FROM NON-POINT SOURCES (CCMP TABLE 5, P.34)

Ongoing Program	Responsible Parties	Status[2]	Description	Upcoming Action
H2-1. The states of Connecticut and New York will continue to use their existing authority to manage non-point source pollution and appropriate federal grants such as CWA§ 319, 604(b), and 104(b) to carry out projects that will help prevent increases and, to the extent practicable, achieve reductions in the non-point source loads from high priority drainage identified in the CT and NY portions of the watershed.	**CTDEP NYSDEC EPA**	Partial Progress	CTDEP is working to implement broad non-point source controls that include nitrogen benefits. Currently, 92 active §319 projects are being implemented from FY94-2000 grants, a watershed model is being developed, and a watershed program has been implemented with early emphasis on the Quinnipiac River. Watershed initiatives are being conducted for the Norwalk and Quinnipiac rivers and Sasco Creek. 19 projects funded under 319 were closed out in 1999. NYSDEC has completed §319 funded projects in Conscience Bay (Town of Brookhaven) and Goose Creek (Town of Southhold), and is implementing projects in Centerport Harbor (Town of Huntington) and Dyke Road (Town of Brookhaven). In addition, a §604(b) funded project is being implemented in Oyster Bay.	CTDEP will expand its watershed program and complete the watershed model. NYSDEC is awaiting response from Town of Oyster Bay on project design.
H2-2. The states of CT and NY are developing their coastal non-point source control programs, as required by §6217 of the Coastal Zone Management Act.	**EPA NOAA CTDEP NYSDOS**	Substantive Progress	CTDEP has received conditional approval for its Coastal Non-point Pollution Control Plan (CNPCP). NYSDOS has completed its LIS Coastal Management program report. A LIS Coastal Advisory Commission has been created in NYSDOS. The Commission met during 1999. USGS is preparing estimates of nitrogen load to Long Island Sound derived from ground water and surface water on the north shore of Long Island using historical water-quality data, model-simulated ground-water discharges, and mean annual streamflow discharges. The effect of land use in three selected areas along the north shore of Long Island on nitrogen load is also being evaluated.	CTDEP will be addressing conditions of the CNPCP. The NY plan is awaiting approval by the Governor.

KEY: 1) Type: Commitment; Recommendation

2) Status for dated actions: Complete, Ahead of Schedule, On Schedule, Behind Schedule, Partially Addressed, Not Initiated
Status for *Ongoing Programs* and ongoing *CCMP Actions*: Fully Met, Substantive Progress, Partial Progress, Discontinued

2. REDUCING NITROGEN LOADS FROM NON-POINT SOURCES (CCMP TABLE 5, P.34)				
Ongoing Program	**Responsible Parties**	**Status[2]**	**Description**	**Upcoming Action**
H2-3. The states of CT and NY will continue to implement general storm water permit programs to control the discharge of storm water from industrial, construction, and municipal activities, in accordance with EPA's national program regulations. These permits will regulate discharges from construction activity greater than five acres and from eleven industrial categories.	**CTDEP NYSDEC**	Substantive Progress	CTDEP has three general storm water permits (industrial, construction, and commercial) for which approximately 2000 registrants have been recorded. Presently, Stamford is the only community in CT that is covered under the EPA's Phase I municipal permit program. In December 1999, EPA released its Phase II regulations for smaller cities and construction sites. CT anticipates 40-50 municipalities will be required to obtain permits under the Phase II storm water regulations. NYSDEC has three general storm water permits (industrial, construction, and commercial).	
H2-4. The states of CT and NY will continue to implement their existing permitting programs, such as the inland and tidal wetland programs, to address non-point nutrient control with respect to LIS management needs, as appropriate.	**CTDEP NYSDEC**	Substantive Progress	Connecticut has virtually eliminated losses of existing tidal wetlands and has restored hundreds of acres in the past few years. Inland wetlands are strictly regulated based on restrictive soil categories with no minimum threshold size. The net area of vegetated tidal wetlands has increased in New York, partly due to the tidal wetlands permitting program.	
H2-5. The states of CT and NY will implement the requirements of the reauthorized Clean Air Act to achieve additional nitrogen emission controls. Major actions include reduction of nitrous oxide emissions through adoption of statewide enhanced vehicle inspection and maintenance programs and stricter emission controls for stationary sources such as power plants.	**CTDEP NYSDEC**	Partial Progress	CTDEP Air and Water Bureaus have been evaluating mutual ozone/nitrogen deposition needs. Nitrogen monitoring and research has been funded through UConn to detail sources and sinks of nitrogen and mercury. States, including CT and NY, have completed "NOx SIP Call" plans, which will result in significant nitrogen reductions from atmospheric sources to LIS and other East Coast estuaries.. NYS has adopted stricter standards for its automobile inspection program. NYS is ahead of schedule in its goal of reducing NOx emissions from electricity generating facilities by 35% by the year 2000.	New York State will continue to reduce NOx emissions by 20,000 tons annually.

KEY: 1) Type: Commitment; Recommendation

2) Status for dated actions: Complete, Ahead of Schedule, On Schedule, Behind Schedule, Partially Addressed, Not Initiated
Status for *Ongoing Programs* and ongoing *CCMP Actions*: Fully Met, Substantive Progress, Partial Progress, Discontinued

2. REDUCING NITROGEN LOADS FROM NON-POINT SOURCES (CCMP TABLE 5, P.34)							
CCMP Action	**Type[1]**	**Responsible Parties**	**When**	**Estimated Cost**	**Status[2]**	**Description**	**Upcoming Action**
H2-6. The EPA will make non-point source management of nitrogen and other pollutants identified by the LISS, through wetlands and riparian zone protection as well as best management practices implementation, high priorities for funding under §319, 104(b), and 604(b) of the Clean Water Act.	**C**	**EPA**	**Annually starting in 1994**		Substantive Progress	NYSDOS is soliciting applications for $4.5M in statewide 50/50 matching Environmental Protection Fund (EPF) grants for Local Waterfront Revitalization Projects. NYSDOS is focusing on EPF funds for planning and design projects. In addition to non-point source pollution control projects, activities may include restoration of former natural coastal areas or enhancement of existing natural coastal areas, stream corridor restoration plans, and designing public access improvements. NYSDOS has received applications for EPF funding in 1999. For FY99 EPA and CTDEP awarded funds for NPS control projects in the amount of $1,276,759 of which $617,500 went to Long Island Sound non-point control projects.	EPA and the states will continue to make NPS management of nitrogen and other LISS-priority pollutants a priority for funding under §319, §104(b)(3), and §604(b) of the Clean Water Act, taking into consideration the increased discretion the states have in directing grant funds under EPA's Performance Partnership Grant system. CT DEP anticipates similar funding for FY2000.
H2-7. Investigate expansion of storm water permitting programs to regulate communities with populations fewer than 100,000 that border Long Island Sound within high priority management zones.	**C**	**CTDEP NYSDEC**	**1994**	**Redirection of base program**	Behind Schedule	EPA issued Phase II storm water regulations in December 1999 that apply to communities less than100,000 population and to developments less than1 but greater than 5 acres. CTDEP has evaluated a general municipal storm water permit that would add cities that meet certain density and population criteria. CTDEP is implementing EPA's final Phase II storm water regulations for municipalities. It is expected that 40-50 municipalities will be issued General Storm water permits.	

KEY: 1) Type: Commitment; Recommendation

2) Status for dated actions: Complete, Ahead of Schedule, On Schedule, Behind Schedule, Partially Addressed, Not Initiated
Status for *Ongoing Programs* and ongoing *CCMP Actions*: Fully Met, Substantive Progress, Partial Progress, Discontinued

2. REDUCING NITROGEN LOADS FROM NON-POINT SOURCES (CCMP TABLE 5, P.34)

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	Description	Upcoming Action
H2-8. In cooperation with the state of New York, Westchester County is developing a non-point source management plan that will include implementing best management practices for non-point source nitrogen control, monitoring their effectiveness and establishing a Westchester County management zone (or bubble) for assessing compliance with the nitrogen load freeze. **The LISS will explore extending the bubble concept to other management zones throughout Connecticut and New York state portions of the Long Island Sound drainage.**	**C**	**NYSDEC Westchester County EPA**	**1993 - 1996**	**$500,000 one time cost**	Substantive Progress	The second full year of a 3-year sampling program was completed in 1999 as part of a $335,000 project by Manhattan College to analyze nutrient and pathogen loads from the Mamaroneck River and Blind Brook. The work will better identify baseline and storm water non-point source loads that can be managed under the Westchester County management zone "bubble". The Westchester County Dept. of Planning has applied for a state grant to analyze the data collected under the project through the LIS 3.0 model. Westchester County's intemunicipal watershed planning efforts to reduce nonpoint source pollution in LIS drainage basin are progressing. The watershed management plans for study areas 3 and 5 were completed in April 1998 and June 1997, respectively. Watershed planning is being initiated in Nassau and Suffolk counties to address local water quality concerns as well as nitrogen loads from these zones. In Nassau county, inter-municipal confederations of watershed communities around Hempstead Harbor and Manhasset Bay have been formed to control and abate non-point pollution in their respective water bodies. Hempstead Harbor Protection Committee released its Water Quality Improvement Plan in May 1998. The Manhasset Bay Protection Committee completed a final report and released it during November 1999 .	The project will be completed in May 2000. The plan for study area 4 will be completed by June 2000. The plan for study areas 1,2, and 6 will begin over the next several years. NYSDEC may provide funding to Suffolk County to coordinate watershed planning effort.
H2-9. Westchester County will implement the recommendations of the County Executive's Citizens Committee on Non-point Source Pollution in Long Island Sound.	**C**	**Westchester County, Local Government**	**1993 initiation and continuing**	**$200K/year for the first 3 years $600K for implementation [Through 1997, $1.7 million has been received for preparation and implementation of the plans.]**	Substantive Progress	The Westchester County Department of Planning is coordinating and providing technical and administrative assistance for the preparation of six subwatershed-specific plans to control nonpoint source pollution in the County's Long Island Sound watershed. [see H2-8]	

KEY: 1) Type: Commitment; Recommendation

2) Status for dated actions: Complete, Ahead of Schedule, On Schedule, Behind Schedule, Partially Addressed, Not Initiated
Status for *Ongoing Programs* and ongoing *CCMP Actions*: Fully Met, Substantive Progress, Partial Progress, Discontinued

2. REDUCING NITROGEN LOADS FROM NON-POINT SOURCES (CCMP TABLE 5, P.34)

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	Description	Upcoming Action
H2-10. Point and non-point nitrogen load estimates will be made in the City of Stamford to assess feasibility of a point/non-point source *trading* program. A cost-effective mix of management options will be proposed that may be used to help decide how nitrogen reduction targets can be met once they are established.	**C**	**CTDEP City of Stamford**	**1992-1994**	**$97,000 in EPA funds, 239,182 in match from Stamford and CH2MHill**	**Complete**	**Report completed by CH2M-Hill, the City of Stamford, and New England Interstate Water Pollution Control Commission. The information is being used to develop cost estimates for point source controls and to assess feasibility of non-point source management**	**None**
H2-11. New York state will pursue the expansion of the State Building Code to include provisions for erosion and sediment control and storm water practices for all construction activities in order to prevent increases in non-point nitrogen runoff.	**C**	**NYSDEC NYSDOS**	**1993-1994**	**Redirection of base program**	Behind Schedule	[See P2-5]	NYSDEC will try to address this through its storm water provisions.
H2-12. Provide technical assistance to coastal municipalities to address impacts of hypoxia in their municipal regulations and plans of development, as required by law.	**C**	**CTDEP**	**1993 and continuing**	**Redirection of base program**	Substantive Progress	Connecticut Public Act 91-170 mandated that coastal municipal zoning regulations and plans of development be established with regard to non-point source and potential pollution of coastal waters with specific reference to hypoxia, toxic contamination, pathogens, and floatable debris. In 1999 CTDEP continued to conduct workshops for local land use officials using its manual, *Coastal Water Quality: A Guide for Local Officials*. The manual, funded under §309 of the Coastal Zone Management Act, contains information on how and use decisions and development impact coastal water quality, and how officials can minimize development effects by requiring the incorporation of appropriate best management practices into proper site design, construction and maintenance. Also included in the manual are model ordinances pertaining to soil erosion and sediment control and storm water management for towns to adopt. The manual was based, in part, on a brochure developed by the Connecticut River Estuary Regional Planning Agency using FY1994 §319 funds.	In CT, municipal outreach will be enhanced through updated workshop materials in support of the municipal best management practices manual. Intended audiences will be expanded to include municipal engineering and public works departments in addition to planning and zoning commissions to focus on implementation as well as planning, to reduce hypoxia conditions in the Sound.
H2-13. Advocate the use of the June nitrate test on agricultural lands to ensure that fertilizer applications to crops do not exceed crop needs.	**C**	**CTDEP NYSDEC**	**1993 and continuing**	**Redirection of base program**	Partial Progress	The June nitrate and fall stalk tests have been found to effectively reduce the amount of nitrogenous fertilizers used on agricultural lands without affecting crop yield. The Housatonic Hydrologic Project, and projects for the Scantic, Quinnipiac, and Yantic Rivers involve June nitrate and fall stalk testing.	CTDEP, NRCS, CT Cooperative Extension, and Soil and Water Conservation Districts will continue to advocate its use.

KEY: 1) Type: Commitment; Recommendation

2) Status for dated actions: Complete, Ahead of Schedule, On Schedule, Behind Schedule, Partially Addressed, Not Initiated
Status for *Ongoing Programs* and ongoing *CCMP Actions*: Fully Met, Substantive Progress, Partial Progress, Discontinued

2. REDUCING NITROGEN LOADS FROM NON-POINT SOURCES (CCMP TABLE 5, P.34)

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	Description	Upcoming Action
H2-14. In addition to continuing general storm water permitting programs, the state of New York should determine if the general permit adequately regulates nitrogen from activities subject to national storm water regulations.	**R**	**NYSDEC**		**$50,000**	Not Initiated	Funding and staffing limitations.	
H2-15. Explore the expansion of current requirements for federally licensed or permitted projects to obtain a water quality certification in New York to protect water quality from sources of pollution to include all projects adjacent to wetlands and other sensitive areas (e.g., adjacent to wetlands) or those that exceed a minimum size (e.g., greater than one acre).	**R**	**NYSDEC**	**1994-1995**	**$50,000**	Not Initiated	Funding and staffing limitations.	
H2-16. The states of Connecticut and New York should develop a habitat restoration plan that includes a list of potential project sites and priorities. Wetland projects that are in close proximity to priority nitrogen management areas should be highlighted.	**R**	**CTDEP NYSDEC NYSDOS**	**1996-1998**	**$300,000 to develop plan**	**Complete**	**See Living Resources and Habitat section (Action L1-13.)**	
H2-17. Evaluate Maryland's *Critical Areas* regulations and the reported nutrient reduction benefits and make recommendations of the potential value of a similar program for Long Island Sound.	**R**	**LISS**	**1993-1995**	**$50,000.**	Not Initiated	Funding and staffing limitations.	

3. CONTINUING MANAGEMENT OF HYPOXIA (CCMP TABLE 6, P. 39)

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	Description	Upcoming Action
H3-1. The LISS will complete work on the LIS 3.0 model and the necessary management scenario projection runs.	**C**	**LISS**	**Complete by June 1994**	**LISS Funded**	**Complete**	**Management scenarios were run in summer of 1996. Model reports are available. Model results were summarized for the September 1997 public meetings on the nitrogen reduction targets.**	

KEY: 1) Type: Commitment; Recommendation

2) Status for dated actions: Complete, Ahead of Schedule, On Schedule, Behind Schedule, Partially Addressed, Not Initiated
Status for *Ongoing Programs* and ongoing *CCMP Actions*: Fully Met, Substantive Progress, Partial Progress, Discontinued

3. CONTINUING MANAGEMENT OF HYPOXIA (CCMP TABLE 6, P. 39)

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	Description	Upcoming Action
H3-2. Develop LIS 3.0-based dissolved oxygen targets and nitrogen load reduction targets for each management zone.	**C**	**LISS**	**Propose by December 1994**	**Redirection of base program**	**Complete**	**The LISS proposed the nitrogen reduction targets in February 1997 and approved them after soliciting public comment in February 1998.**	
H3-3. Establish a firm timetable for achieving, within 15 years, the load reduction targets by zone, with progress measured in five year increments.	**C**	**CTDEP NYSDEC**	**Propose by December 1994**	**Redirection of base program**	**Complete**	**The TMDL for LIS was released for public comment in November 1999. The nitrogen reduction targets include a 15-year reduction schedule for both point and non-point sources, after providing for time to develop management zone plans and make permit modifications.**	**The TMDL is to be finalized and submitted to EPA for approval.**
H3-4. Develop zone-by-zone plans to achieve the nitrogen load reduction targets.	**R**	**CTDEP NYSDEC Local and County Governments**	**1995-1997* *modified to 8/99 in the Phase III Hypoxia Agreement**	**$1 M committed for three New York zones; $700,000 per year for three years needed**	Behind Schedule	The TMDL released for public comment included a WLA/LA by zone. In CT, the TMDL and WLA/LA will serve as Zone Plans.	The final TMDL must include a facility-specific WLA. NY still intends to prepare more detailed zone-by-zone plans.
H3-5. Encourage and support development of innovative, cost-effective technologies to reduce point and non-point sources of nitrogen.	**R**	**LISS**	**Ongoing**	**LISO Base Program**	Partial Progress	CTDEP sponsored workshops BNR technologies.	
H3-6. Periodically recalibrate LIS 3.0 to reflect the changing conditions of the Sound and use it to explain these changing conditions and to evaluate proposals to modify the management plan, as necessary.	**R**	**LISS**	**As Needed**	**$300,000 per recalibration**	Substantive Progress	The LISS is participating in a system wide nutrient workgroup that will evaluate the system wide eutrophication model (SWEM) developed by NYCDEP. A Model Evaluation Group (MEG) has been formed to provide independent peer review. MEG and Nutrient Reduction Work Group Meetings were held during 1999 to assess calibration and validation procedures.	

KEY: 1) Type: Commitment; Recommendation

2) Status for dated actions: Complete, Ahead of Schedule, On Schedule, Behind Schedule, Partially Addressed, Not Initiated
Status for *Ongoing Programs* and ongoing *CCMP Actions*: Fully Met, Substantive Progress, Partial Progress, Discontinued

4. FUNDING TO IMPLEMENT HYPOXIA MANAGEMENT PLANS (CCMP TABLE 7, P. 41)

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	DESCRIPTION	Upcoming Action
H4-1. Increase funding of the Connecticut and New York State Revolving Fund Programs to meet statewide wastewater control needs, including Long Island Sound nitrogen control needs.	**R**	**Congress Connecticut New York**	**Over 20 years**	**Federal cost of $700 M per year. Cost to states of $175 M per year.**	Partial Progress	In 1996-99, CT committed $350 M for sewage treatment plant reconstruction projects that will benefit LIS and estimates that Clean Water Funding, if maintained at current levels, will be adequate to finance Phase III upgrade requirements. In CT the 1999 commitment was $75 M.	For FY2000 the CT Bond Commission approved over $26 M for the Branford STP upgrade and over $4 M for additional upgrades at the Stamford STP. Fairfield will begin upgrade construction with funds from the $30.4 M grant awarded in 1999.
H4-2. Appropriate $50 M to fund a *Long Island Sound Challenge Grant Program,* a significant portion of which would be used to ensure that the Phase III nitrogen control efforts get off to a fast start with full local government cooperation.	**R**	**Congress**	**Over five years**	**$50 M**	Partial Progress	Legislative proposals have been introduced into Congress that would fund implementation of the LISS. The Long Island Sound Restoration Act was reintroduced in November 1999 to extend authorization for the LISS to 2003 and authorize annual appropriations of $80 million, including grants for nitrogen reduction under CWA §119.	
H4-3. Fully fund the non-point source control programs under §319 of the Clean Water Act and §6217 of the Coastal Zone Act Reauthorization Amendments to support additional non-point source management activities.	**R**	**Congress**	**Ongoing**	**§ 319 - $130 M nationwide § 6217 - $12 M nationwide**	Partial Progress	§319 was funded at $200 M for FY 1999. As part of the Clean Water Action Plan, the administration has proposed FY 2000 funding of $200 M .	The LISS, through its citizen participants, will advocate for increased funding under §319.

5. MONITORING AND ASSESSMENT OF HYPOXIA (CCMP TABLE 8, P. 42)

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	Description	Upcoming Action
H5-1. The states of Connecticut and New York, New York City, and the Interstate Sanitation Commission will monitor dissolved oxygen and nutrients in Long Island Sound, its major tributaries, and key sewage treatment plants.	**C**	**CTDEP NYSDEC NYCDEP ISC**	**1994**	**$340,000**	**Complete**	**Monitoring was performed as planned and the results summarized by each agency.**	
H5-2. Develop a coordinated monitoring plan to assess the effectiveness of implementation, considering innovative approaches and building upon existing programs.	**C**	**LISS**	**Completed in early 1994**	**$25,000**	**Complete**	**A LISS monitoring workshop was held in 1993. The workshop integrated findings of the LISS to develop a comprehensive, Sound wide monitoring plan. Portions of the plan are being implemented.**	

KEY: 1) Type: Commitment; Recommendation

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Status for *Ongoing Programs* and ongoing *CCMP Actions*: Fully Met, Substantive Progress, Partial Progress, Discontinued

5. MONITORING AND ASSESSMENT OF HYPOXIA (CCMP TABLE 8, P. 42)

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	Description	Upcoming Action
H5-3. As part of a combined National Estuary Program Action Plan Demonstration Project and a CTDEP Long Island Sound Research Fund project, the EPA and the state of Connecticut will complete a demonstration project designed to evaluate and quantify the benefits of a riparian zone in the denitrification process.	**C**	**CTDEP**	**1992-1994**	**$100,000 for Phase I**	**Complete**	**This project will help quantify the benefits of vegetated riparian zones in nitrogen removal. Monitoring at the site was completed in June 1997. A final report is available. Interested parties should contact CT-DEP's Office of Long Island Sound Programs at (860) 424-3034.**	
H5-4. The state of Connecticut, through its Long Island Sound Research Program, has solicited proposals to identify the role of riverine transport in attenuating the load of nitrogen delivered to the Sound in the Housatonic or Naugatuck Rivers. If an acceptable proposal is identified, it will be a priority for funding in 1994.	**C**	**CTDEP**	**1993-1995**	**$150,000**	Partially addressed	CTDEP was not successful in funding a comprehensive project to study a watershed in detail through the Long Island Sound Research Fund. Some projects are looking at portions of the problem. CTDEP hired a consultant using federal 104(b) funds to develop a comprehensive watershed model for the state. The project began in early 1997.	The Research Fund project is on hiatus. Continue development of the watershed model.
H5-5. The state of Connecticut, through its Long Island Sound Research Program, will continue to fund atmospheric deposition monitoring of nitrogen a two coastal locations through May, 1994.	**C**	**CTDEP**	**1991-1994**	**$50,000 per year**	**Complete**	**Report for two years of atmospheric wet and dry deposition monitoring has been accepted by CTDEP. The original action has been completed but CT has continued the project and enhanced monitoring at 8 locations since 1997 with the University of Connecticut.**	**Monitoring is continuing through 2000 using SEP funds.**
H5-6. The EPA Office of Research and Development will continue to develop regional dissolved oxygen criteria for marine and estuarine waters.	**C**	**EPA**	**Complete 1994**	**Redirection of base program**	Partially Addressed	EPA issued draft DO criteria for the Virginian Province in November 1999.	The public comment period is 45 days beginning January 27, 2000.
H5-7. The NYSDEC will complete its initial study on the effects of hypoxia and disease on Long Island Sound lobsters.	**C**	**NYSDEC**	**1994**	**LISS Funded**	**Complete**	**A report is available from the EPA LIS Office or from the NYSDEC Division of Marine Resources.**	

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Status for *Ongoing Programs* and ongoing *CCMP Actions*: Fully Met, Substantive Progress, Partial Progress, Discontinued

5. MONITORING AND ASSESSMENT OF HYPOXIA (CCMP TABLE 8, P. 42)

CCMP Action	Type[1]	Responsible Parties	When	Estimated Cost	Status[2]	Description	Upcoming Action
H5-8. Continue long-term dissolved oxygen and nutrient monitoring of the Sound, its major tributaries, and key sewage treatment plants.	**R**	**CTDEP NYSDEC ISC EPA NYCDEP**	**Continuing**	**$300,000 per year**	Substantive Progress	Ambient monitoring was continued in 1999. CTDEP funds the USGS to monitor tributaries and both NYSDEC and CTDEP have expanded monitoring requirements for point source discharges. The ISC and NYCDEP also perform ambient monitoring of LIS.	Monitoring has been funded for 2000 EPA's EMPACT project will supplement monitoring efforts. EPA's Coastal 2000 program may fund CTDEP and NYSDEC for special monitoring in LIS, including several embayments in Summer 2000.
H5-9. Continue to monitor finfish and crustaceans of the Sound with emphasis on determining population response to low dissolved oxygen.	**R**	**CTDEP**	**Continuing**		Substantive Progress	Special studies to identify hypoxic impacts on fish distribution are completed and reports are available from CTDEP Marine Fisheries. See Living Marine Resources and Habitat (Action **L9-1.)**	CTDEP continues to monitor finfish and lobster resources, but the studies are analyzed now to manage the state of fish and lobster resource stocks in light of DO's role.
H5-10. Continue to monitor the effects of hypoxia on disease of lobsters.	**R**	**NYSDEC**	**Continuing**	**$65,000**	**Discontinued**	**See Living Marine Resources and Habitat (Action L9-8.) The LISS in partnership with NY and CT Sea Grant programs released a Request for Proposals covering research in November 1999.**	**Work under the RFP will commence in 2000. Additional FY2000 LISS funds will be reserved for research in 2000.**

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